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PATENT TRADEMARK OFFICE

# **UTILITY APPLICATION**

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**OF**

**DONALD MOW**

**FOR**

**UNITED STATES PATENT**

**ON**

**CONNECTING DEVICES**

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# CONNECTING DEVICES

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## CROSS-REFERENCE TO RELATED APPLICATION

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This application claims the benefit of Chinese Patent No. 03245194.6 filed on April 16, 2003, Chinese Patent No. 03266082.0 filed on June 27, 2003, Chinese Patent Application No. 03266084.7 filed on June 27, 2003, and Chinese Patent No. 03266463.X filed on July 2, 2003, all of the references which are hereby incorporated by reference.

## BACKGROUND

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Framing construction using steel or wood is a commonly used method for building various structures such as, villas, apartment buildings, townhouses, office buildings, homes, or the like. Generally, there is difficulty abutting two or more surfaces together because there is a small contacting surface to provide sufficient bracing to join these two surfaces together. Additionally, this process can be slow and inefficient as many workers are required to provide support while the rafter or beam is secured into position. That is, workers may hold members such as rafters against a ridge beam by hand to make the connection. Holding the rafter or other beams by hand will make any connections a difficult process as the work is performed high in the air and should the rafter or beam be dropped, injury or property damage may occur. Accordingly, there remains a need for an improved device and method for constructing a frame for a building.

## SUMMARY

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Disclosed herein are various embodiments of connectors that may be utilized in building construction. According to one embodiment, a connector is composed of a generally U-shaped structure comprising a base coupled to a first wall and a second wall. The first wall and second wall of the U-shaped structure are at opposite ends of the base, and the first wall and second wall are substantially perpendicular to the base. A first bracing member is coupled to a first end of the first wall of the generally U-shaped structure, and a second bracing member is coupled to a first end of the second wall of the generally U-shaped structure. The first wall, second wall, first bracing member, and second bracing member can also include a plurality of openings provided thereon.

In use, the connectors may be used to connect the lower end of a rafter beam to a header beam or a vertical wall. In an alternate use, the connectors may be used to connect a rafter to a ridge beam or a vertical wall. For instance, the connectors may be affixed to a ridge beam, vertical wall, or header beam by securing the first bracing member and the second bracing member to these members via the openings. The rafter beam or header beam that will be joined to the ridge beam or vertical wall may be inserted into the generally U-shaped structure and secured thereto via the openings with screws, nails, or the like.

In another embodiment, the connector is composed of at least one bracket. The bracket is composed of a first, second, and third planar member having first and second ends and first and second sides. The first side of the first planar member is coupled to the second side of the second planar member. The first end of the first planar member

is then coupled to the second end of the third planar member where the first planar member extends generally in a X-direction, the second planar member extends in a generally Y-direction, and a third planar member extends generally in a Z-direction. The first, second, and third planar members also include a plurality of openings that are  
5 sized to receive a nail, screw, or the like.

In use, the connectors may be utilized to connect a building element such as, but not limited to, hip ridge to an interior wall corner. In an alternate use, the connector may be used to connect a hip ridge beam or other building element to an outer wall corner. For instance, the first bracket may be secured to the top of a header beam  
10 wherein the first planar member and the second planar member are affixed to the beam and the third planar member extends upwards to the beam or member. A second bracket may be secured to an adjacent wall in a similar manner. Accordingly, a space is formed between the third planar members of the first and second bracket such that the space is sized to receive to a hip-ridge beam or other building element to be secured  
15 to a corner of a building. The first and second brackets may be secured to the various building members via the openings on the bracket with screws, nails, or other fastening devices.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

- 20 Figure 1 is a perspective view of one embodiment of a connecting device;
- Figure 2 is a template of the connecting device of Figure 1;
- Figure 3 is a perspective view of another embodiment of a connecting device;
- Figure 4 is a template of the connecting device of Figure 3;

Figure 5 is a perspective view of yet another embodiment of a connecting device;

Figure 6 is a template of the connecting device of Figure 5;

Figure 7 is a perspective view of another embodiment of a connecting device;

5 and

Figure 8 is a template of the connecting device of Figure 7.

### DETAILED DESCRIPTION

The detailed description set forth below in connection with the appended  
10 drawings is intended as a description of exemplary embodiments and is not intended to represent the only forms in which the exemplary embodiments may be constructed and/or utilized.

Turning now to the figures, Figure 1 illustrates one embodiment of a connecting device 10. The connecting device 10 is composed of a generally U-shaped structure  
15 that is made up of a first wall 13 and a second wall 14 coupled at opposite ends of a base 15. As shown in Figure 1, the walls 13, 14 of the connector 10 are generally rectangular. In other embodiments, the walls 13, 14 may be any polygonal shape or other shape known or developed in the art. As shown in Figure 1, the walls 13, 14 are substantially perpendicular to the base 15. As those skilled in the art will appreciate,  
20 the walls 13, 14 may be coupled to the base 15 at a variety of angles. The space between the walls 13, 14 is sized such that a piece of lumber, metal, or other structural element may be fitted therein.

As shown in Figure 1, the base 15 is angled upwards. As those skilled in the art will appreciate, the angle of the base 15 may be adjusted to accommodate various designs of a building structure. Figure 3 is another embodiment of a connector 30 where the base 35 is angled downwardly. As those skilled in the art will also appreciate, the distance and size of the base 15 and the distance between the walls 13, 14 may be varied to accommodate sizes of a building member.

The bracing members 11, 12 are generally rectangular structures, but it is also contemplated that their members may be any polygonal shape known or developed in the art. Bracing members 11, 12 may be separate pieces that are coupled to the walls 13, 14. In another embodiment, the bracing members 11, 12 and the walls 13, 14 are integral. That is, the components that comprise the connector 10 can be formed from a single piece of material. As shown in Figure 1, the bracing members 11, 12 are coupled to the walls 13, 14 and are essentially perpendicular to the walls 13, 14. In other embodiments, the bracing members 11, 12 may be placed at various angles relative to the walls 13, 14 to accommodate various designs for the intended structure.

Also, as shown in Figure 1, the connector 10 includes a plurality of openings 16 that are positioned on the various walls 13, 14 and bracing members 11, 12 that comprise the connector 10. The openings are sized to receive a nail, screw, rivet, or other fastening means known or developed in the art.

Turning now to Figure 2, a template of the connector 10 is illustrated. The template is a generally planar structure having a plurality of openings 16 provided thereon. As shown in Figure 2, the template includes portions of the base 15, the first

and second walls 13, 14, and first and second bracing members 11, 12. The template may be formed into a complete connector 10 by folding the walls 13, 14 upward. The first and second bracing members 11, 12 may be formed by bending template at lines 21, 22 such that the walls 13, 14 are perpendicular to the bracing member 11, 12. The angle  $\alpha$  is the angle at which the base 15 angles upward. As those skilled in the art will appreciate, the angle  $\alpha$  may be adjusted to vary pitch or angle of the base 15.

The connector 30 may be formed by using the template as depicted in Figure 4. The template may be a generally planar sheet of material that may be made from a metal or a metal alloy. The template is cut into the shape as depicted in Figure 4 and then the walls 33, 34 may be bent to an angle at approximately 90° or substantially perpendicular to each wall in order to form to a complete connector 30. The first bracing member 31 may be bent along dashed line 40 such that the bracing structure 31 is substantially or generally perpendicular to the wall 33. Likewise, the second bracing member 32 may be bent along dashed line 41 such that the bracing member 32 is substantially perpendicular to the wall 34.

In use, the connectors 10, 30 are utilized in building and constructing the frames or coupling various building elements together. The connectors 10, 30 allow two building members that may be perpendicular to each other to be coupled together. Various screws or nails may be inserted through the openings 16 of the connectors 10, 30 to secure to the building elements. As shown in Figures 1 and 3, the connectors 10, 30 may be used to secure two abutting components. For instance, the connectors 10, 30 may be used to connect the lower end of a rafter beam to a header beam or a vertical

wall. In alternate use, the connectors 10, 30 may be used to connect a rafter beam to a  
 ridge beam or a vertical wall. That is, the bracing members 11, 12 may be secured to a  
 surface of a building element. Another building element may be placed within a space  
 defined by the generally U-shaped structure and secured therein such that the two  
 5 building elements are secured together in a generally perpendicular fashion.

Figure 5 illustrates yet another embodiment of a connector 70. The connector  
 70 is composed of a first bracket 71 and a second bracket 72. The first and second  
 brackets are generally mirror images of one another. In other embodiments, the first  
 bracket 71 and second bracket 72 may be configured differently depending upon the  
 10 intended use for the brackets 71, 72 and the positioning of the connector 70 within a  
 building structure. According to various embodiments, the connector 70 may be used  
 at an inner or outer portion of a corner of a building.

As shown in Figure 5, the first and second bracket 71, 72 are comprised of a  
 first generally planar member 74 which is composed of a first end, a second end, first  
 15 side, and a second side. In one embodiment, one of the sides of the first bracket 71 has  
 an angle  $\alpha$ . A second planar member 73 is then coupled to an edge of the first planar  
 member 74. Accordingly, a coupling of the first planar member 74 forms a generally  
 L-shaped structure. A third planar member is then coupled to an adjacent side of the  
 first planar member 74. Those skilled in the art will appreciate that the third planar  
 20 member 75 may be coupled to the first planar member 74 at a varying angle other than  
 a  $90^\circ$  angle. Furthermore, according to various embodiments, the planar member 73,  
 76 may be placed at angles  $\alpha$ ,  $\beta$  relative to the first planar member 74, 77. As those

skilled in the art will appreciate, the angles  $\alpha$ ,  $\beta$  may be substantially the same, or the angles may be different. According to various embodiments, the angles may range from approximately  $1^\circ$  to approximately  $90^\circ$ .

Generally, the three planar members 73, 74, 75 are configured such that the  
5 first planar member generally extends in the X-direction. That is, the first planar member 74 extends along an X-axis. The first planar member 74 extends in a direction generally along the X-axis, the second planar 73 member extends in a direction generally along the Y-axis, and the third 75 planar member extends in a direction generally along the Z-axis. That is, these three members 73, 74, 75 are on different  
10 planes that are generally perpendicular to one another.

Furthermore, as those skilled in the art will appreciate, the brackets 71, 72 may be made from a unitary piece of material as depicted in Figure 6. The members 73, 74, 75 of the connector 70 may be formed by bending the template at the dashed lines. In one embodiment, the planar members 73, 74, 75, 76, 77, 78 are bent along the  
15 dashed lines at an angle of approximately  $90^\circ$ . In other embodiments, depending upon the intended application of the brackets 71, 72 the angle at which each member 73, 74, 75, 76, 77, 78 is bent at the dashed line may be varied between approximately  $1^\circ$  to  $179^\circ$ . In other embodiments, the various members 73, 74, 75, 76, 77, 78 that comprise the brackets 71, 72 may be made from individual pieces that are welded or otherwise  
20 secured together.

In use, the first bracket 71 and second bracket 72 are positioned on the top of a first and second building member (that form adjacent walls) and are spaced apart such

that a third building member may be inserted between the members 73, 76. As those skilled in the art will appreciate, the building element or member can be a hip ridge beam, header beam, or other load-bearing or non-load bearing beam. Accordingly, the third building element may be secured to a corner of a building. The brackets 71, 72  
5 provide additional surface area in which the building element may be secured to a corner.

Figure 7 illustrates yet another embodiment of a connector 90 that can be adapted for use in an interior wall corner. In contrast, the connector 70, which is depicted in Figure 5, may be used on an outer portion of a wall. The connector 70 can  
10 be used to connect a hip-ridge beam to a wall corner whereas the connector 90 may be used to connect a hip-ridge to an interior wall. The connector 90 is composed of a first bracket 91 and a second bracket 92 that may be utilized on two adjacent walls that comprise a corner. The brackets 91, 92 are positioned on the two adjacent walls and spaced apart such that the space between the first wall 93 and the second wall 96 is  
15 sized such as to receive a building element. That is, the connectors 70, 90 may be placed atop the header beams or the top portion of adjacent walls.

Figure 8 illustrates the templates that may be used to form the first and second brackets 91, 92 that are utilized with the connector 90. The templates are generally planar sheets of material formed from metal or a metal alloy. The templates are cut  
20 into the shapes as depicted in Figure 8, and then the walls 93, 94, 95, 96, 97, 98 may be bent along the dashed lines to an angle at approximately 90°, substantially perpendicular to each wall in order to form a complete bracket 91, 92. In other

embodiments, depending upon the intended application of the brackets **91, 92**, the angle at which each bracket is bent along the dashed lines may be varied between approximately  $1^{\circ}$  to  $179^{\circ}$ . Prior to bending the various walls **93, 94, 95, 96, 97, 98** to form a complete bracket **91, 92**, openings may be drilled into the surfaces that are sized  
5 to engage a screw, nail, rivet, or other fastening means.

In closing, it is understood that the embodiments described herein are merely illustrative of the principles of these varying embodiments. Other modifications that may be made are within the scope of these embodiments described herein. Thus, by way of example, but not of limitation, alternative configurations may be utilized in  
10 accordance with the teachings herein. Accordingly, the drawings and description are illustrative and not meant to be a limitation thereof.